Holy Bible
God. Country.

Saint Patrick's Day Brief

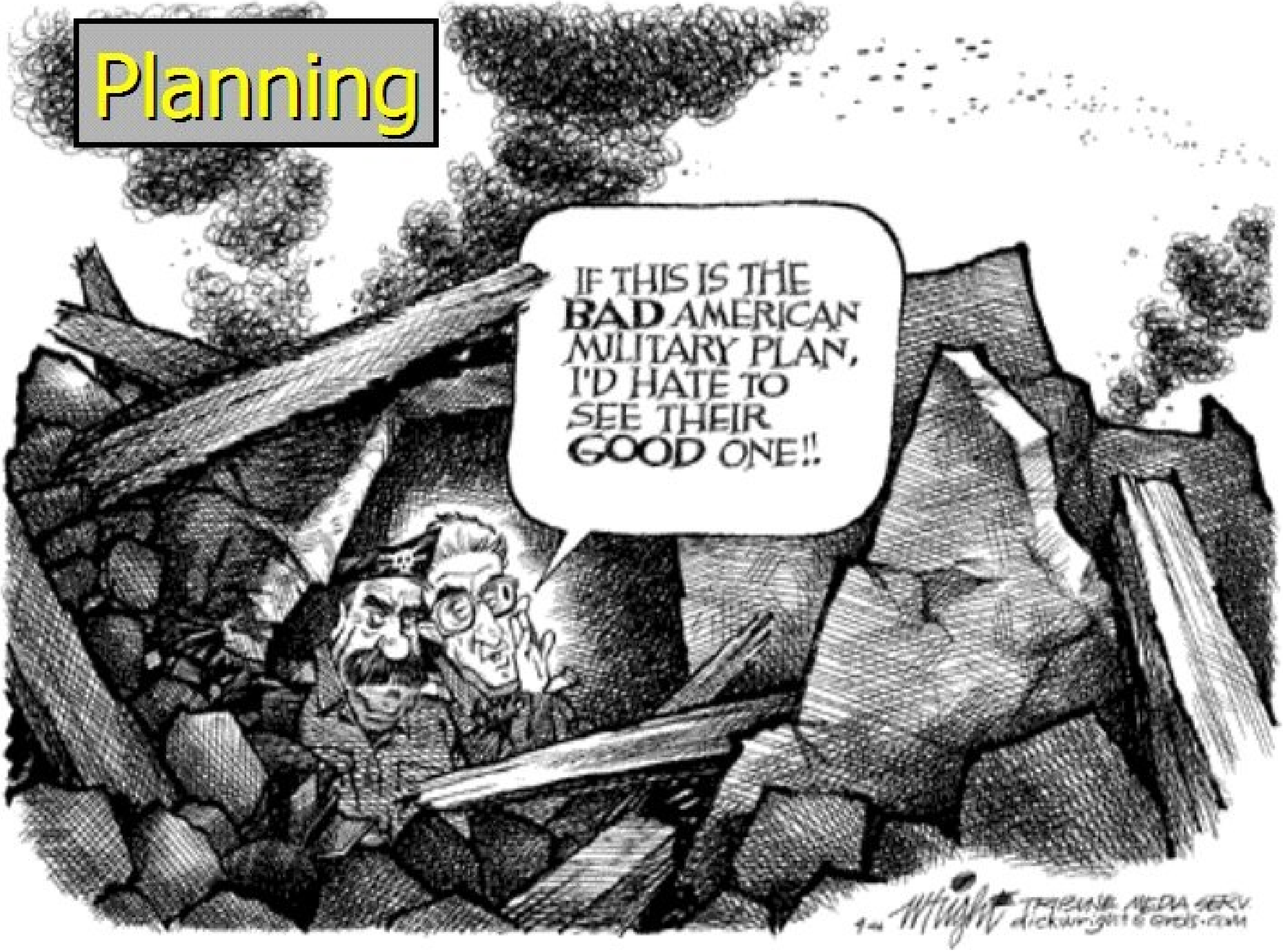
Colonel Mike Boyd
Engineer Advocate

USMC Engineer Operations in Operation Iraqi Freedom

Road to War: Jan 02 – Mar 03

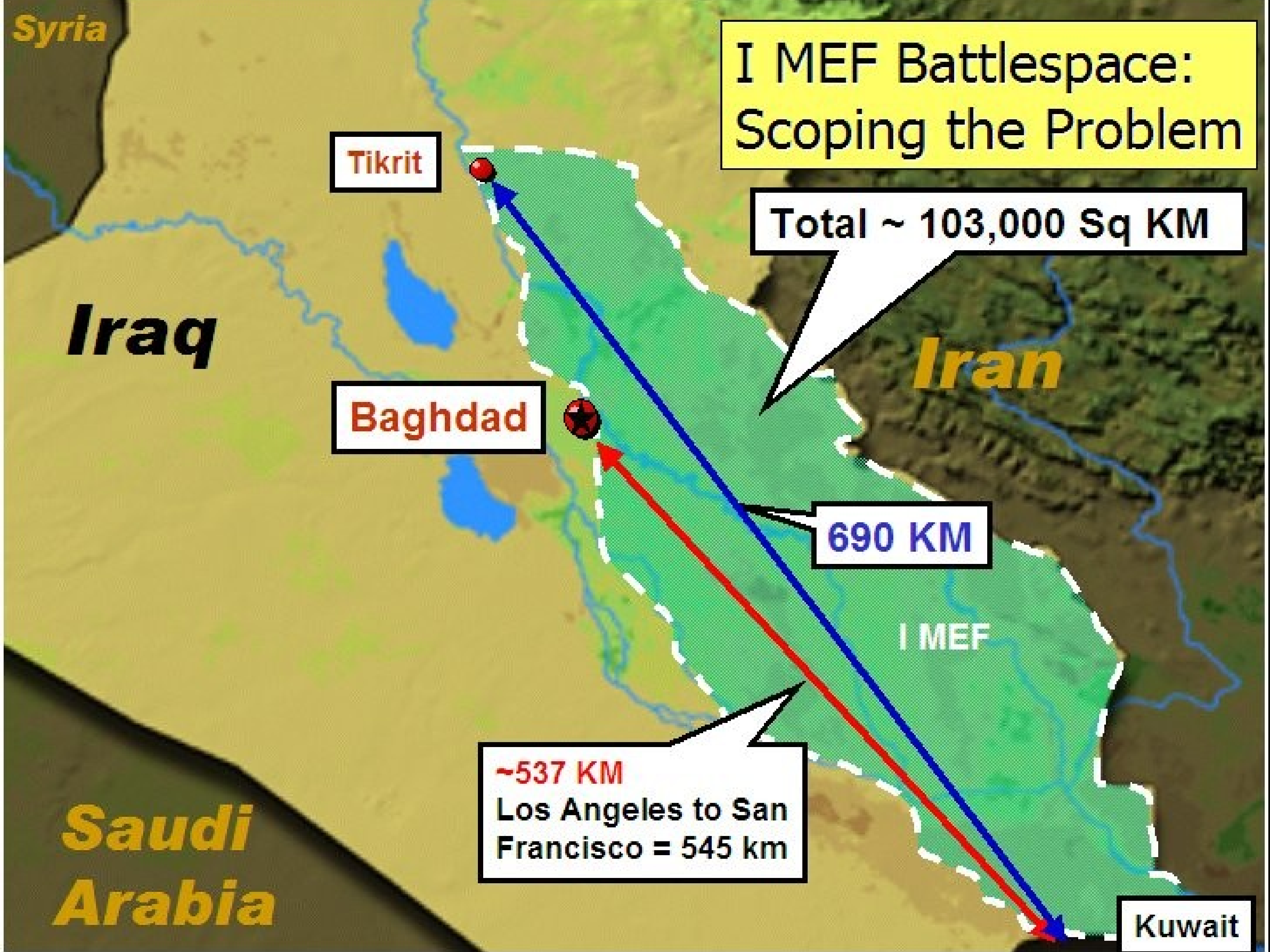
PL FLORIDA
47E
PL FLORIDA
TAOC

Planning



IF THIS IS THE **BAD** AMERICAN MILITARY PLAN, I'D HATE TO SEE THEIR **GOOD** ONE!!
Wright
TRIBUNE MEDIA SERV

I MEF Battlespace: Scoping the Problem



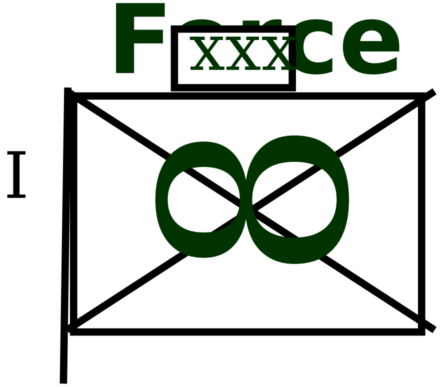
Total ~ 103,000 Sq KM

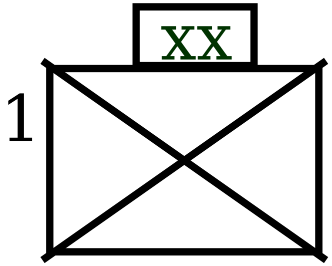
690 KM

~537 KM
Los Angeles to San Francisco = 545 km

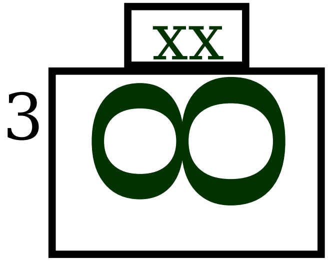
Syria
Tikrit
Iraq
Iran
Baghdad
I MEF
Saudi Arabia
Kuwait

1st Marine Expeditionary Force

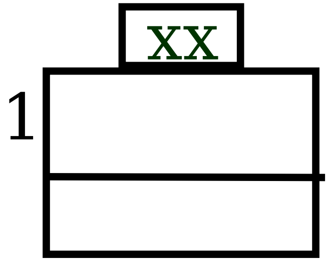




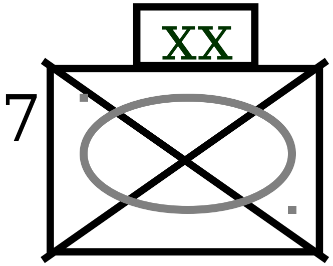
1st Marine
Div (Rein)



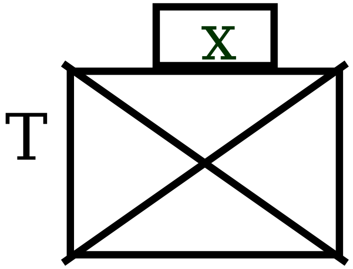
3d Marine Air Wing
(MAW)



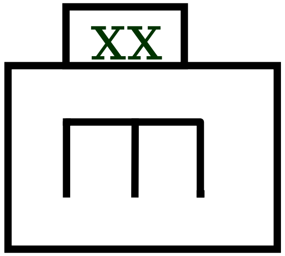
1st Force Service
Support Group
FSSG



7th Armored
Division (UK)

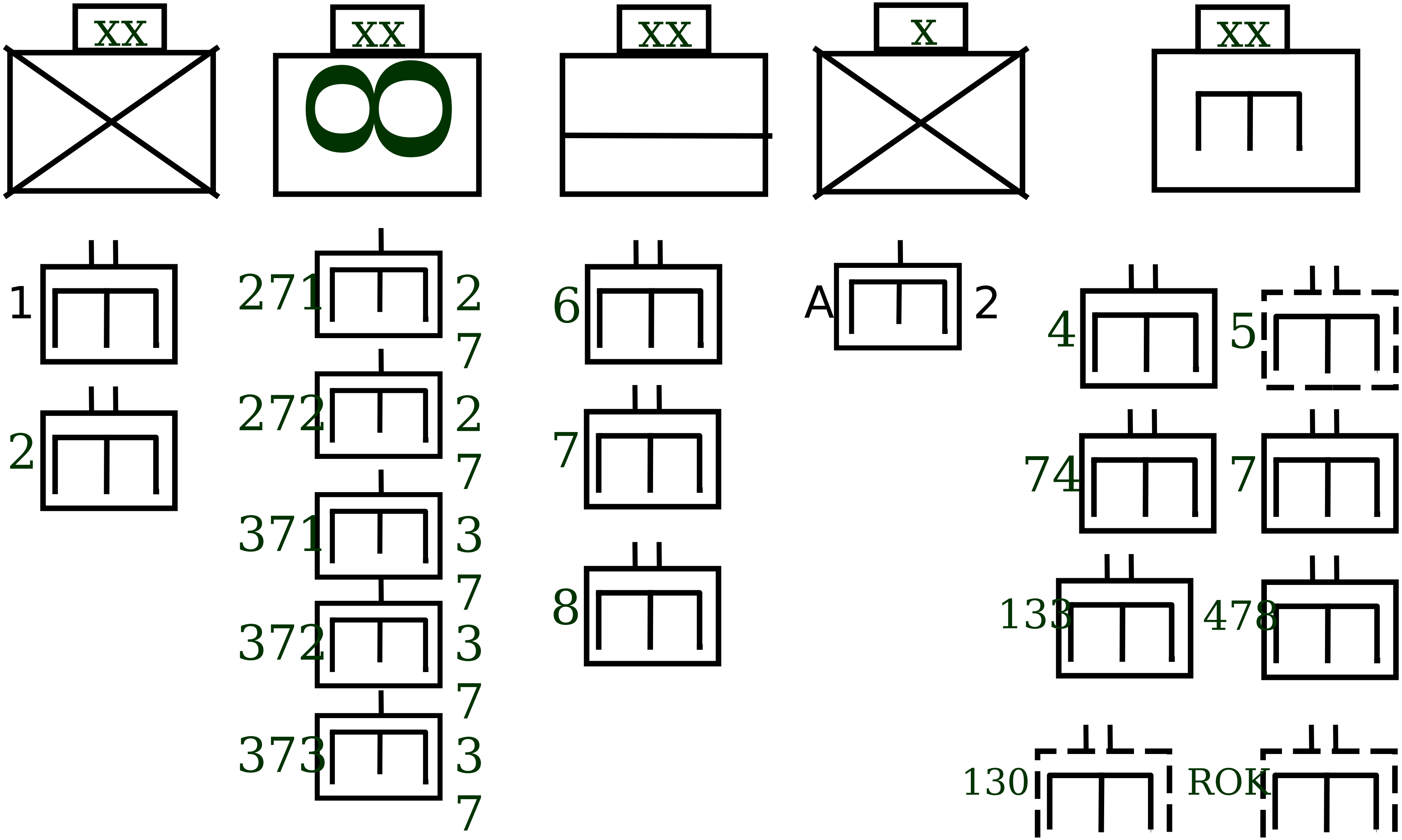


TF Tarawa



MEF Engr
Group (MEG)

Engineer organization in I MEF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8
A
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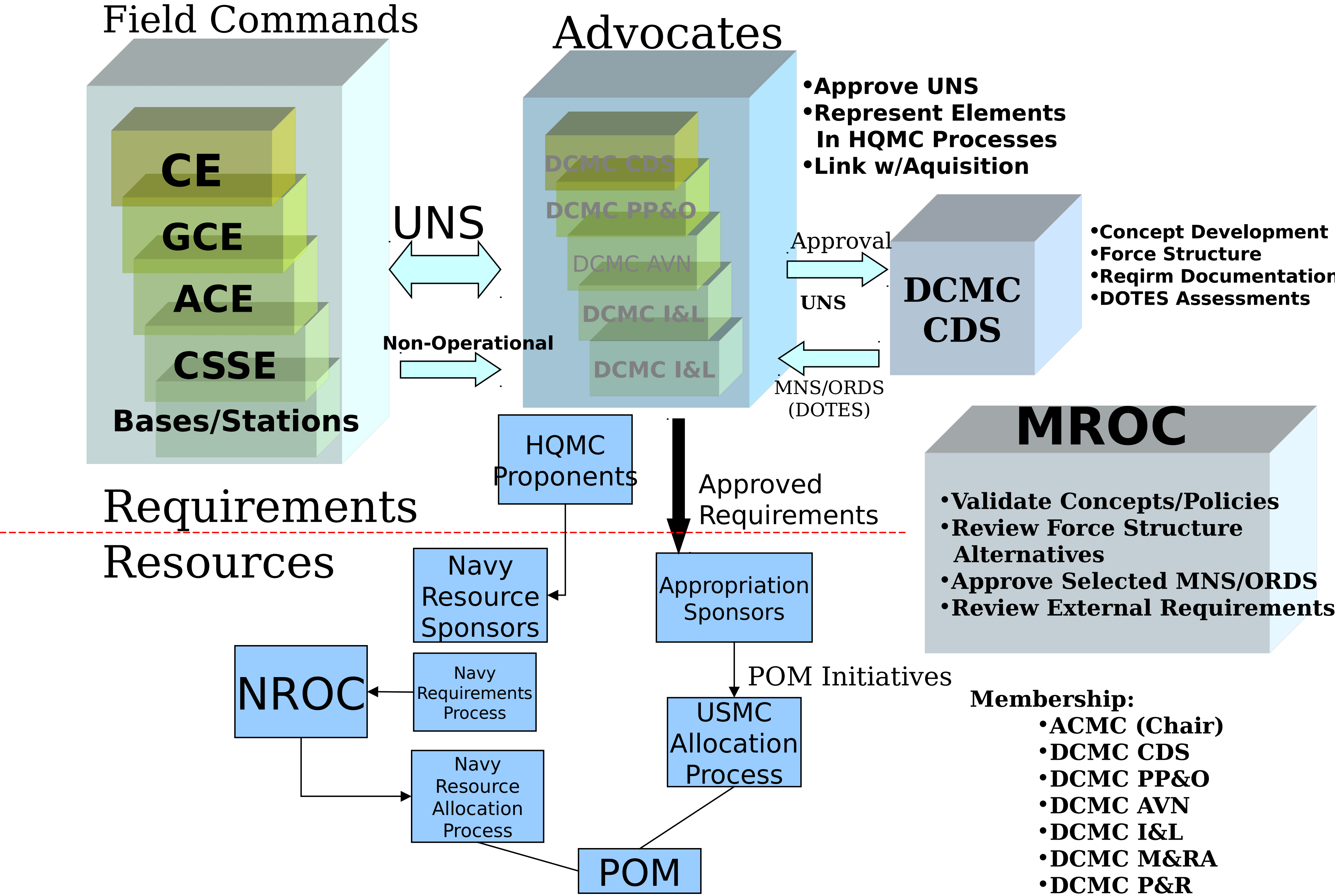
4
5
74
7
133
478
130
ROK

I MEF had 10 Engineer Battalions and 5 Marine Wing Support Squadrons during period of hostilities

USMC Requirements Process



Field Commands

CE
GCE
ACE
CSSE
Bases/Stations

UNS

Non-Operational

Advocates

DCMC CDS
DCMC PP&O
DCMC AVN
DCMC I&L
DCMC I&L

- Approve UNS
- Represent Elements In HQMC Processes
- Link w/Aquisition

Approval

UNS

MNS/ORDS
(DOTES)

DCMC CDS

- Concept Development
- Force Structure
- Reqirm Documentation
- DOTES Assessments

MROC

- Validate Concepts/Policies
- Review Force Structure Alternatives
- Approve Selected MNS/ORDS
- Review External Requirements

HQMC Proponents

Approved Requirements

Requirements

Resources

Navy Resource Sponsors

Appropriation Sponsors

POM Initiatives

NROC

Navy Requirements Process

USMC Allocation Process

Navy Resource Allocation Process

POM

Membership:
- ACMC (Chair)
- DCMC CDS
- DCMC PP&O
- DCMC AVN
- DCMC I&L
- DCMC M&RA
- DCMC P&R

Example of Accelerated Procurem

Surface Mine Plows

Need Identified – 20 Jan 03
Approved - 27 Jan 03
Contracted - 05 Feb 03
Received in AOR-27 Feb 03

Full Width Mine Plows

Obstacle Marking Systems

D7 Flails

D9 Bulldozers

Mabey Johnson Bridging

Surface Mine Plows

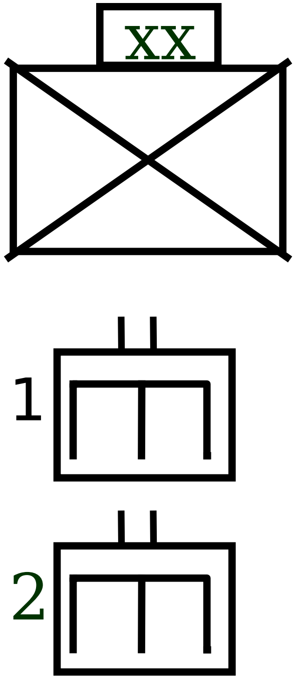
Fascines

D7/D8 Tractor Protective

Bridge Erection Boats

Towed Assault Bridges

Combined Combat Engineer Bns



- Pre LD rehearsals limited by time and logistics – Come as you are war
- Basic Skills Training validated
  - ***Every Marine a Rifleman***

- Division Engineers fought as integral portion of combined arms team
  - Engineer Community’s reputation enhanced by performance

Combat Engr Bn Achievements

- Combat Engineers fought extensively

Sensitive Site exploitation

- Engineers held and supported exploitation of numerous sensitive sights
  - Atomic energy facility
  - Yellow cake factory

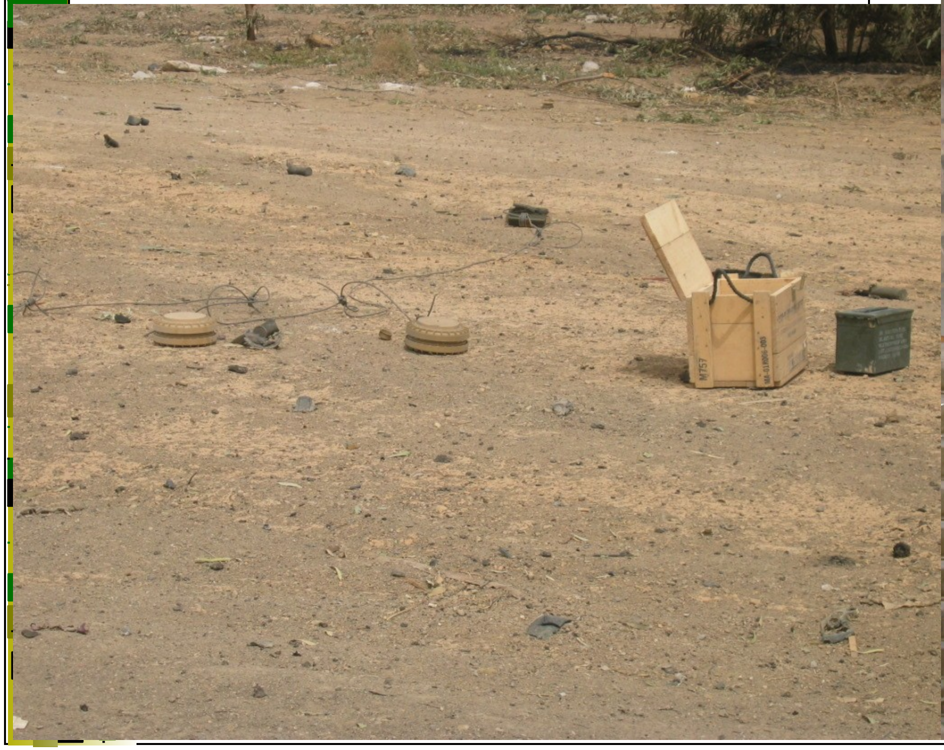
Predict, detect and locate Munitions

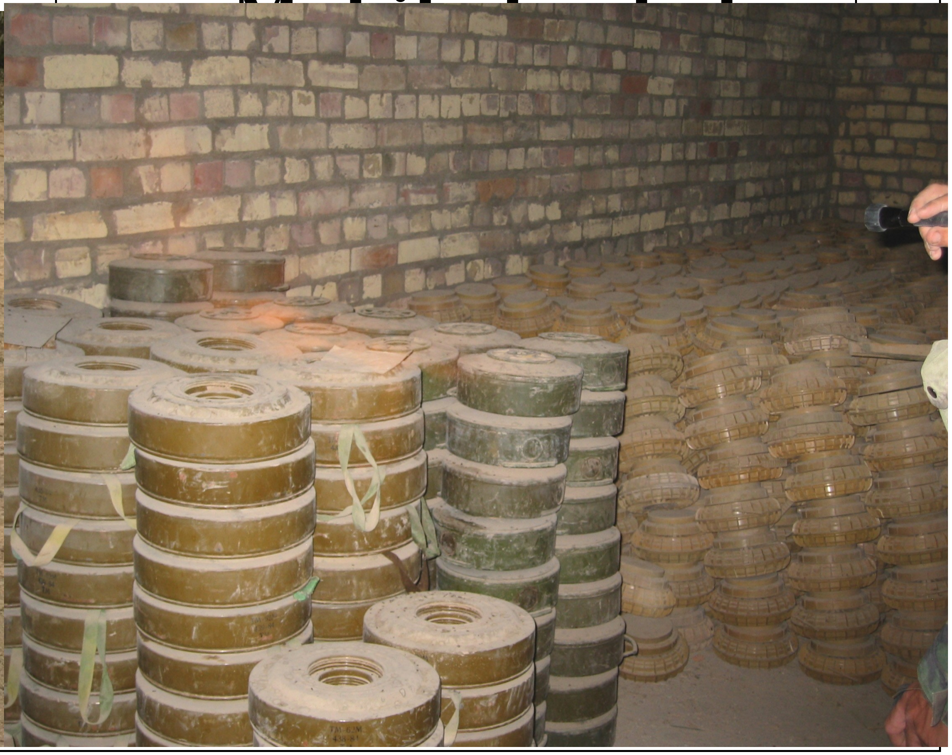
- **During the War**

  Tactical Obstacles; few, poorly employed, rarely covered by fire and easily bypassed

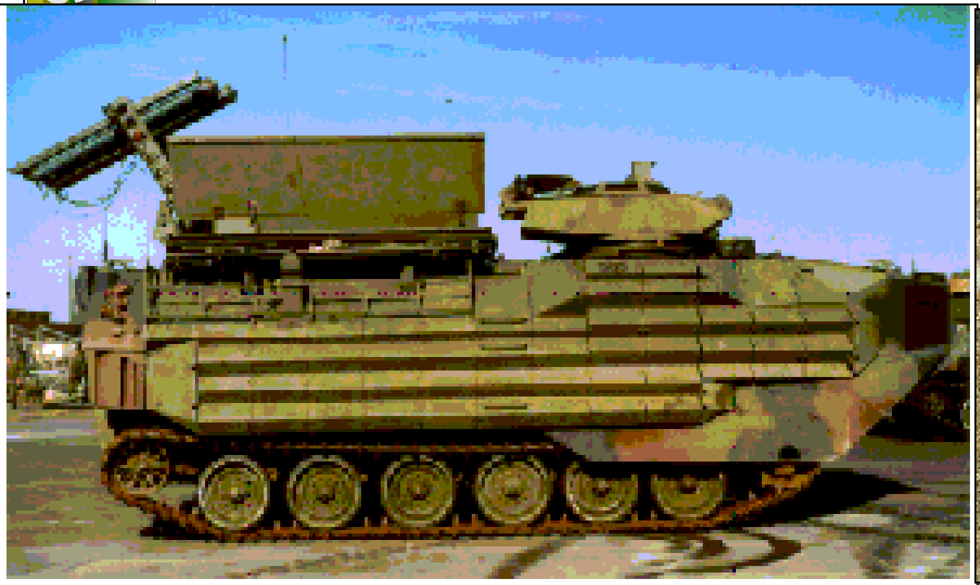
Huge stocks captured

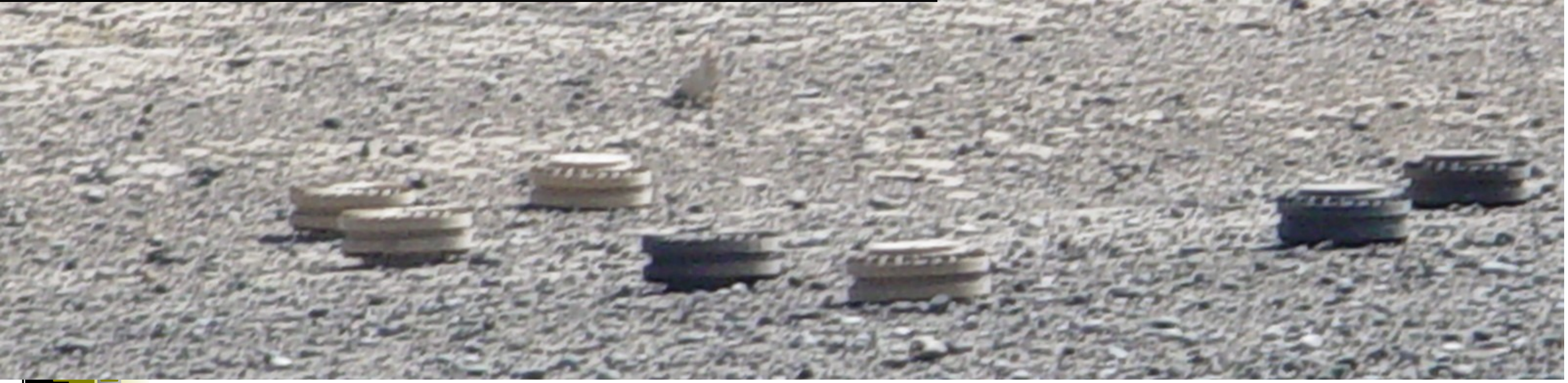
- **900,000 mines**
- **Plans**
- **Maps**
- **Mobile loaded**





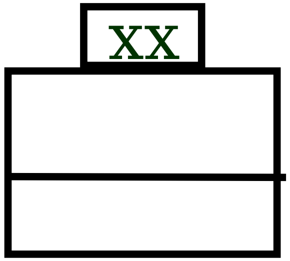
Line Charge Use

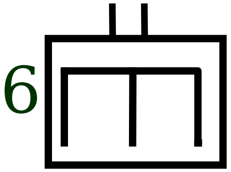




- **Blast hardened Italian mines (VS 1.6)**
- **Surface laid on asphalt**
- **Ineffective to deal with mine threat – only scorched the mines**

Engineer Support Bns





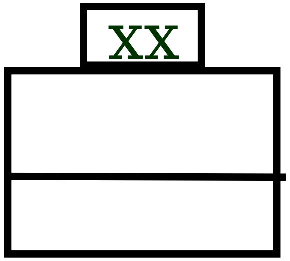
Sixth Engineer Support Bn

Water and Fuel

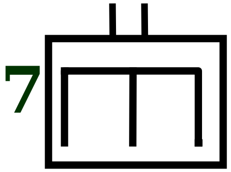
Longest Hosereel in History

60 Miles
3 Days to construct
Max Pumping 600KGal/day

Engineer Support Bns

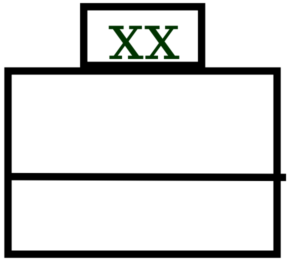


Seventh Engineer Support Bn

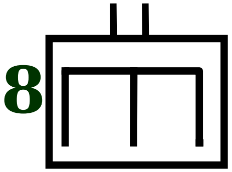


- **Construction and Mobility**
- **Hampered by lack of organic transportation**

Engineer Support Bns

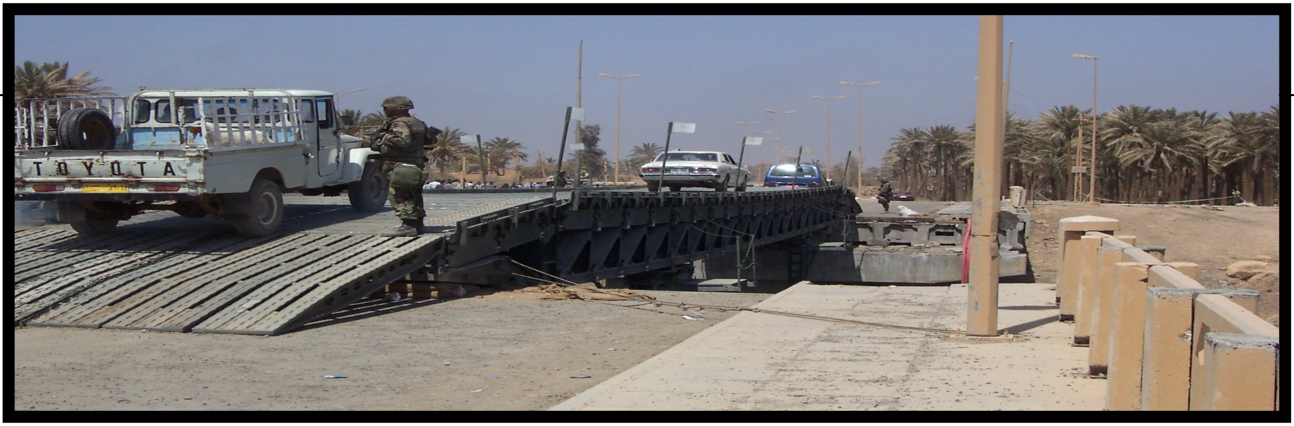


Eighth Engineer Support Bn



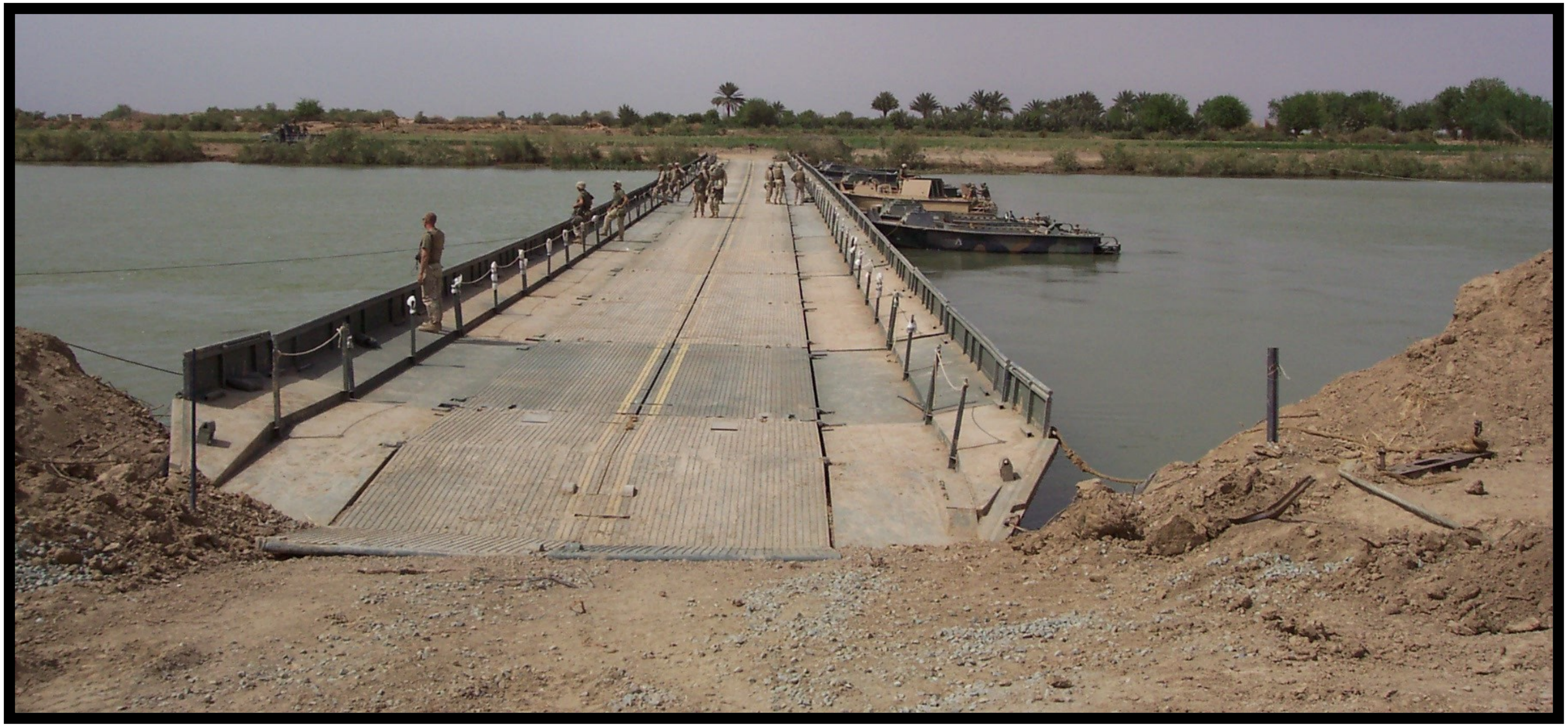
Bridge Task Force

Bridging Missions

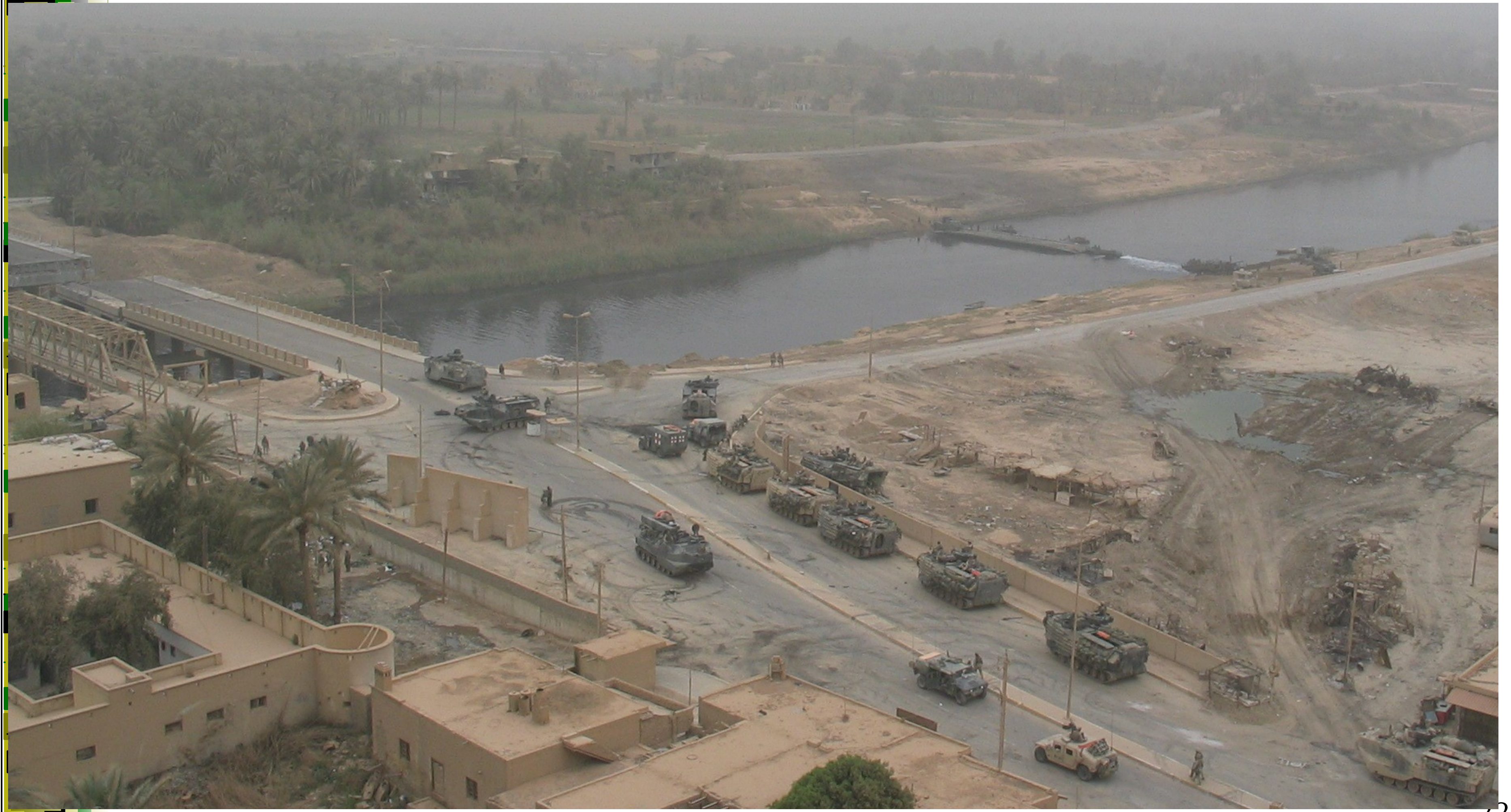


MGB over destroyed Route 6 Bridge into Baghdad.
Apr 2003

145m IRB “PEARL 3” Tigris River Crossing, An Numaniyah Iraq April 2003



Assault Crossing of Diyala River

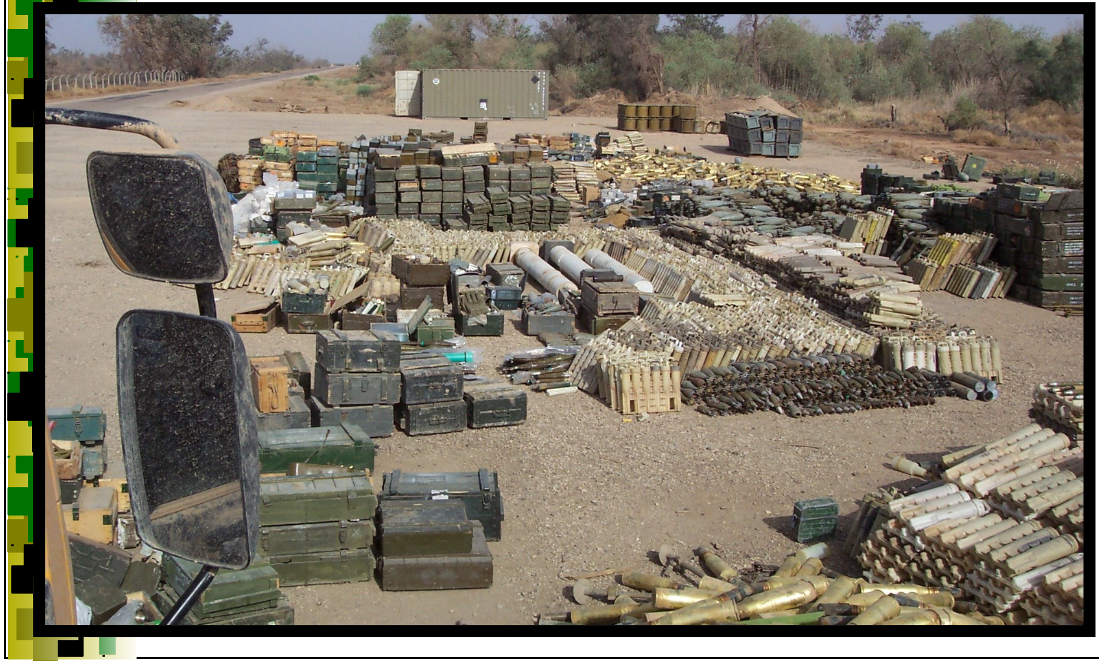


Explosive Ordnance Disposal (EOD) Efforts

Staggering amounts of UXO

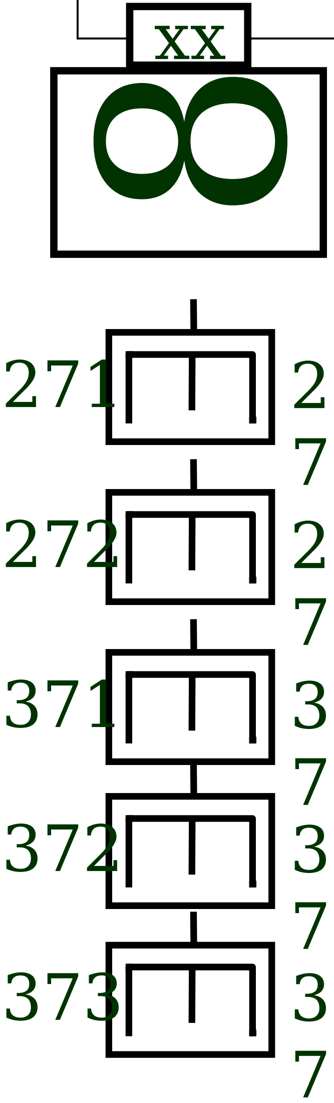
Over 1.16 million pounds

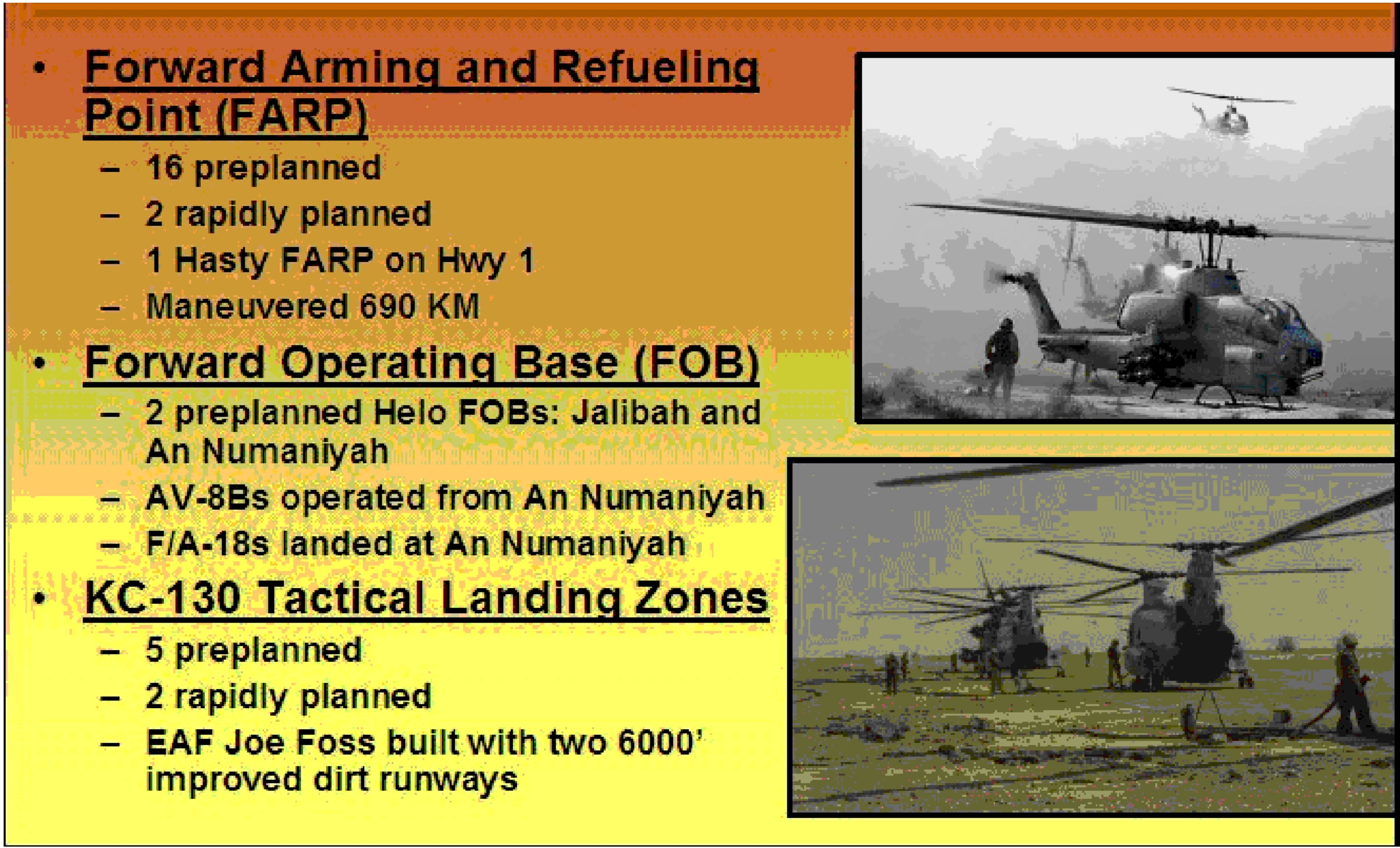
800,000 items



Marine Wing Support Squadrons

Aviation Ground Supp





- **Forward Arming and Refueling Point (FARP)**
  - 16 preplanned
  - 2 rapidly planned
  - 1 Hasty FARP on Hwy 1
  - Maneuvered 690 KM
- **Forward Operating Base (FOB)**
  - 2 preplanned Helo FOBs: Jalibah and An Numaniyah
  - AV-8Bs operated from An Numaniyah
  - F/A-18s landed at An Numaniyah
- **KC-130 Tactical Landing Zones**
  - 5 preplanned
  - 2 rapidly planned
  - EAF Joe Foss built with two 6000' improved dirt runways

Al Jaber Pre-War Construction

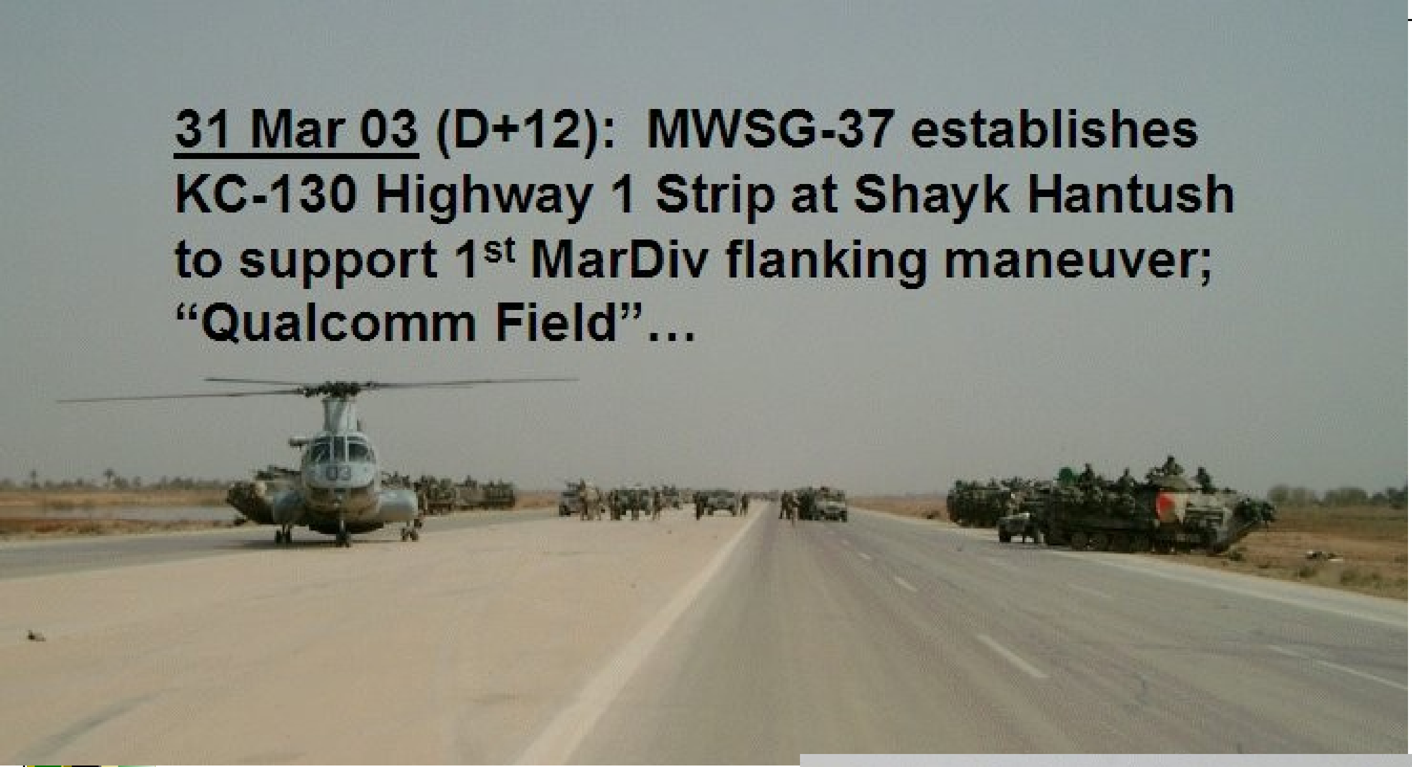
- **Al Jaber AB, Kuwait**
  - 400 strongback tents
  - Chow hall for 4000 Marines
  - 40,000 cubic meters of gravel
  - 30,000 cubic meters of aggregate
  - Munitions storage area

- **Aircraft parking ramp construction**
  - 53 Days – 24 / 7

Ali Al Salem Pre-War Construction

- **Ali Al Salem AB, Kuwait**
  - 440 strongback tents
  - Chow hall for 4000 Marines
  - 40,000 cubic meters of gravel
  - 30,000 cubic meters of aggregate
  - Munitions storage area

3d MAW convoys fight through An Nasiriyah bridge crossings and Highway 7

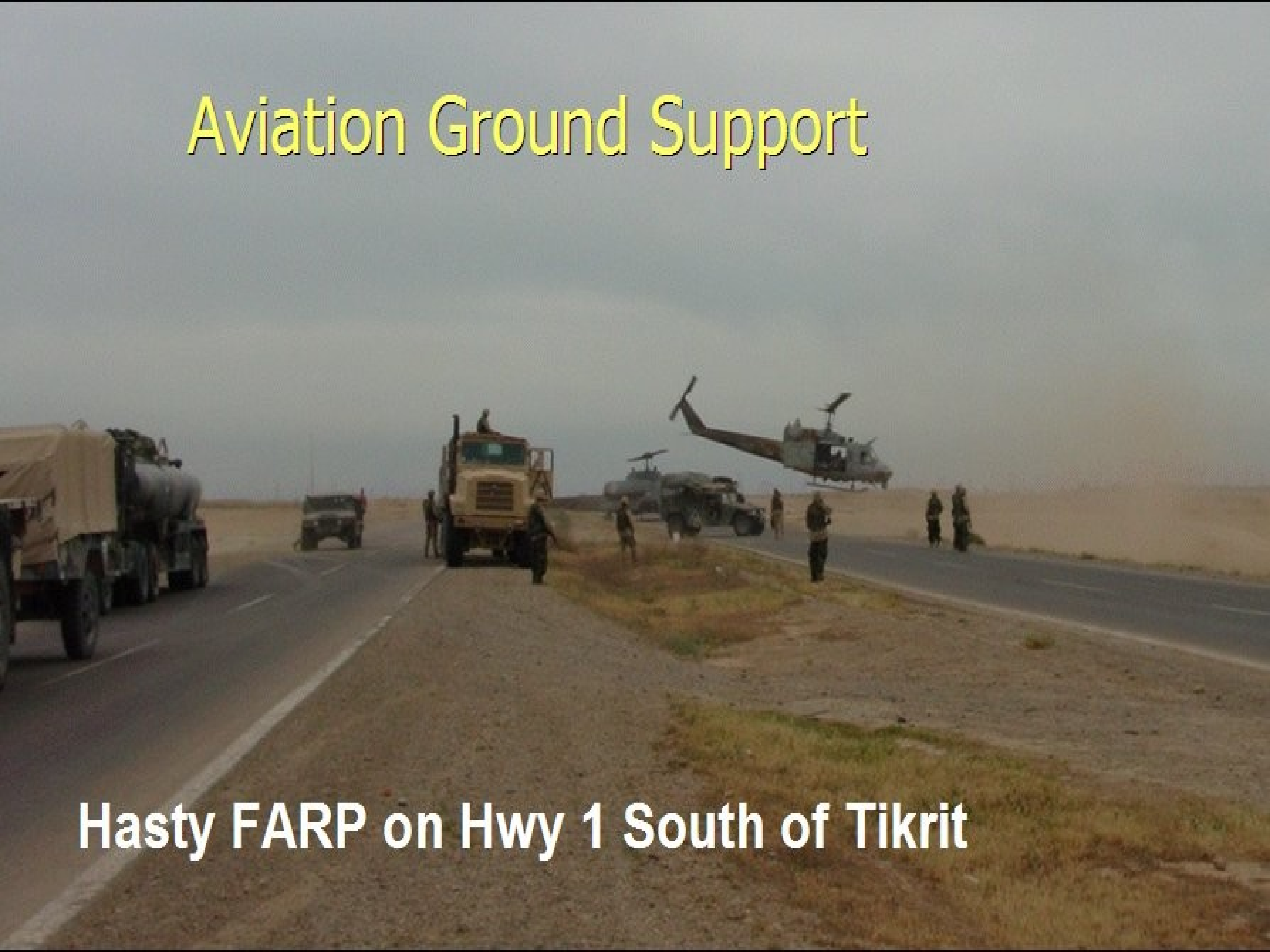


31 Mar 03 (D+12): MWSG-37 establishes KC-130 Highway 1 Strip at Shayk Hantush to support 1st MarDiv flanking maneuver; "Qualcomm Field"…

Harriers land…

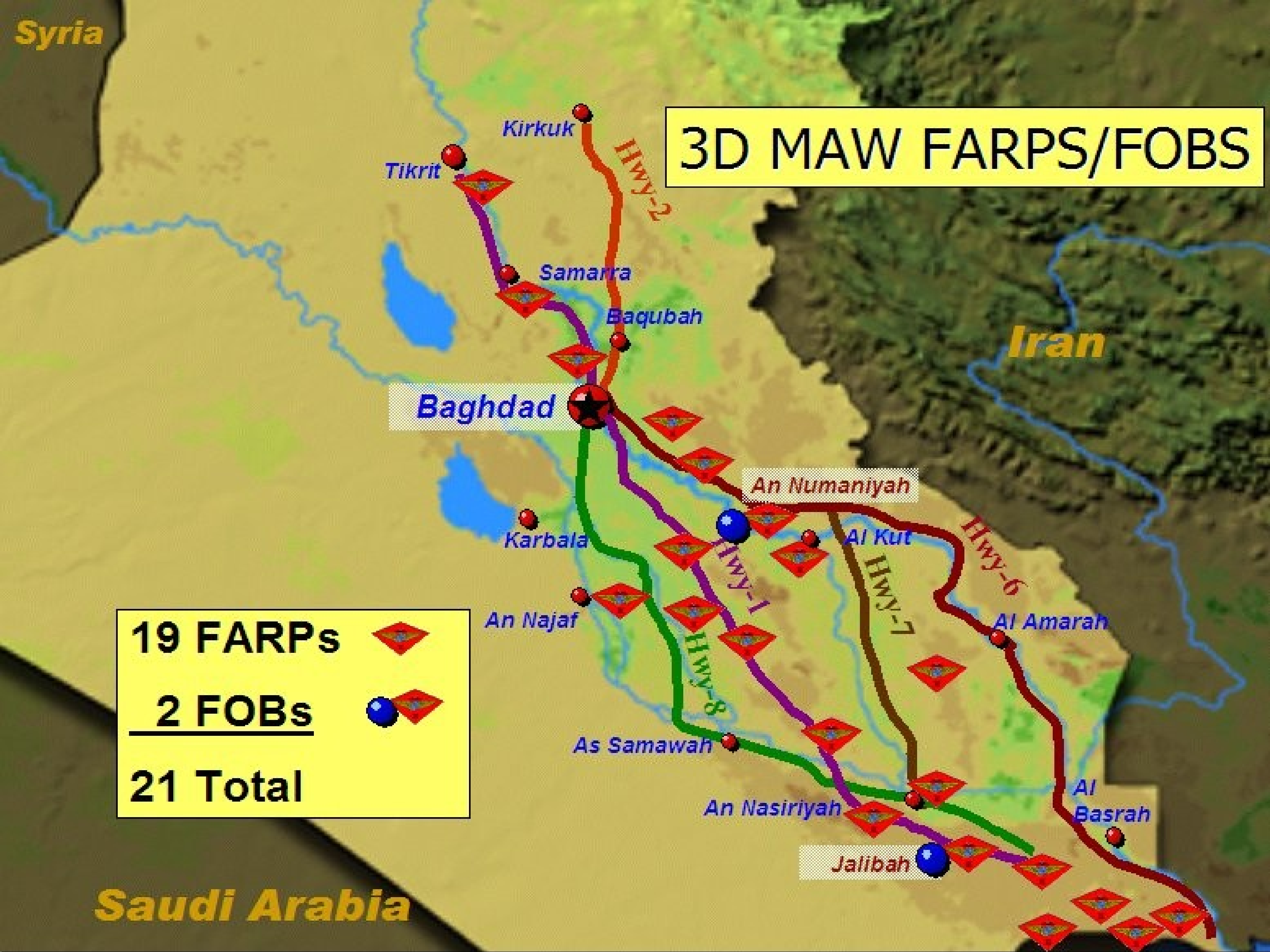
…and refuel
at "Qualcomm"
…just 70 miles south of Baghdad

Aviation Ground Support



Hasty FARP on Hwy 1 South of Tikrit

3D MAW FARPS/FOBS



Syria
Kirkuk
Tikrit
Hwy-2
Samarra
Baqubah
Iran
Baghdad
An Numaniyah
Al Kut
Karbala
Hwy-1
Hwy-7
Hwy-6
An Najaf
Al Amarah
Hwy-8
As Samawah
An Nasiriyah
Al Basrah
Jalibah
Saudi Arabia

19 FARPs

2 FOBs

21 Total

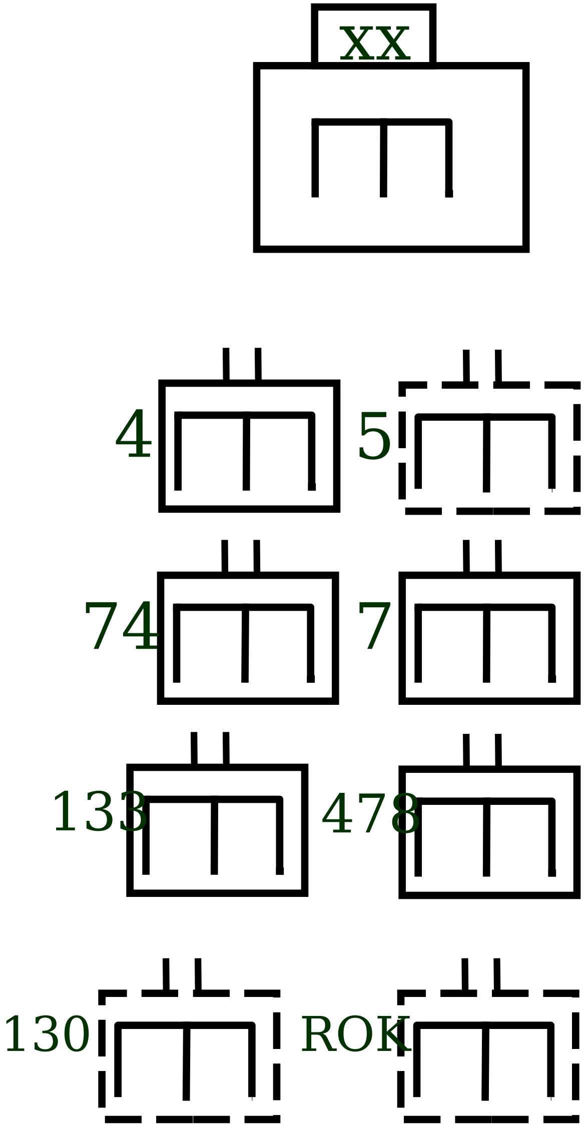
Aviation Ground Support

- **Fuel**
  - 11 million gals of fuel distributed
  - 20K gals of fuel per FARP / Day
  - 7,800 combat sorties supported
  - 130,000 gals JP-8 provided to 1st MARDIV and TF Tarawa
- **Rapid Runway Repair**
  - Repaired 5 captured airfields for KC-130 operations
    - Four airfields were KC-130 capable in under 12 hours
    - One airfield had eight 40'X15' craters and was KC-130 capable in 48 hours
  - Prepared two highway strips for assault support operations in less than 12 hours

Aviation Ground Support

- **MWSG GROUND TRANSPORTATION**
  - 250 convoys
  - 508,252 tons of cargo moved
  - 125,000 MREs and 144,000 lbs of artillery ordnance for 1st MARDIV during the 2-day push for Baghdad
- **EAF**
  - 1.5 million sqft of AM-2 Matting installed
  - 172 panels of mobi-mat installed at FARPs and FOBs
  - (2) 6,000 ft dirt runways built

MEF Engineering Group


XX
4
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74
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133
478
130
ROK

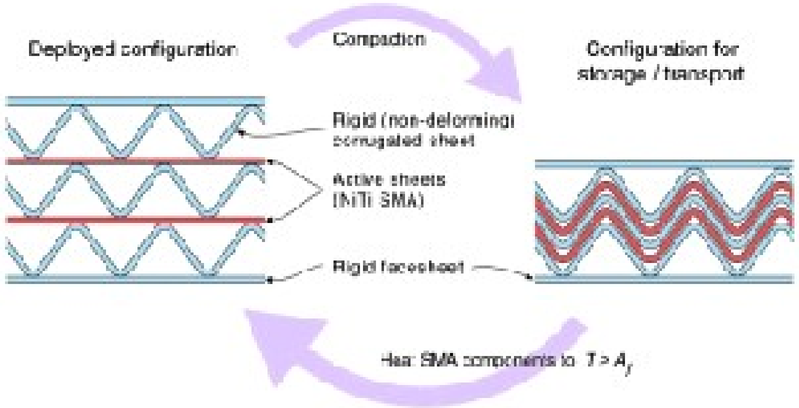
MEG OIF Efforts

SANCHEZAGUIRRE
NCHEZ

Lessons Learned

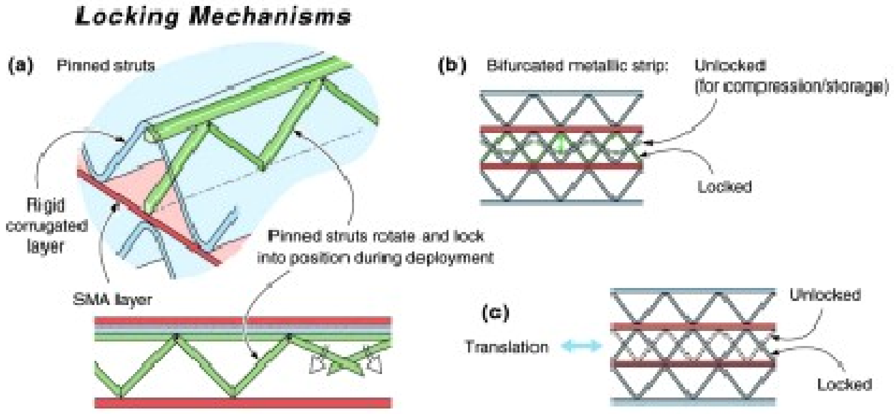
- Be careful not to use OIF as a template
- Early Deployment of Engineers Necessary
- Mobility on the Battlefield crucial
- EOD and Force Protection challenges increasing
- Experimentation needed for future capabilities

ellular Metal Deployable Structures


Deployed configuration
Compaction
Configuration for storage / transport
Rigid (non-deforming) corrugated sheet
Active sheets (NiTi SMA)
Rigid facesheet
Heat SMA components to $T > A_f$

AM2 Mat Expeditionary Landing Field
- **Hollow Al extrusions (2’x12’, 2’x6’)**
- **Heavy**
- **High stowed volume**

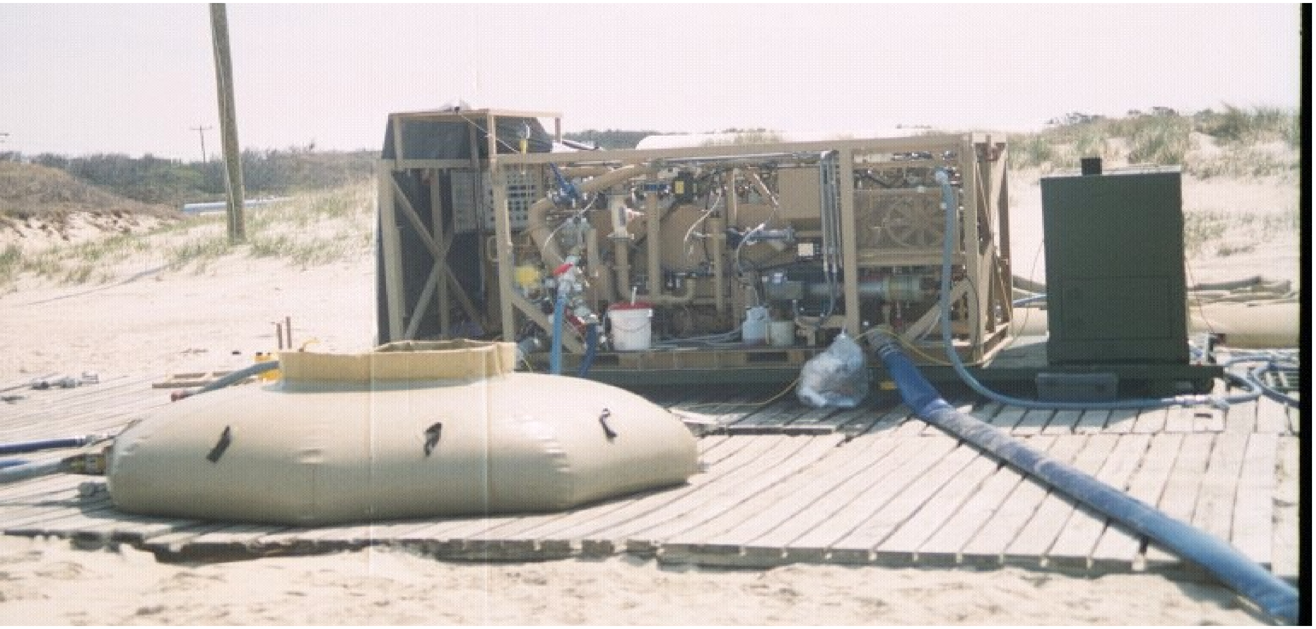
Payoff
- **30 % decreased weight**
- **50 % decreased stowed volume**


Locking Mechanisms
(a) Pinned struts
Rigid corrugated layer
SMA layer
Pinned struts rotate and lock into position during deployment
(b) Bifurcated metallic strip:
Unlocked (for compression/storage)
Locked
(c)
Translation
Unlocked
Locked

Dust Abatement Solutions

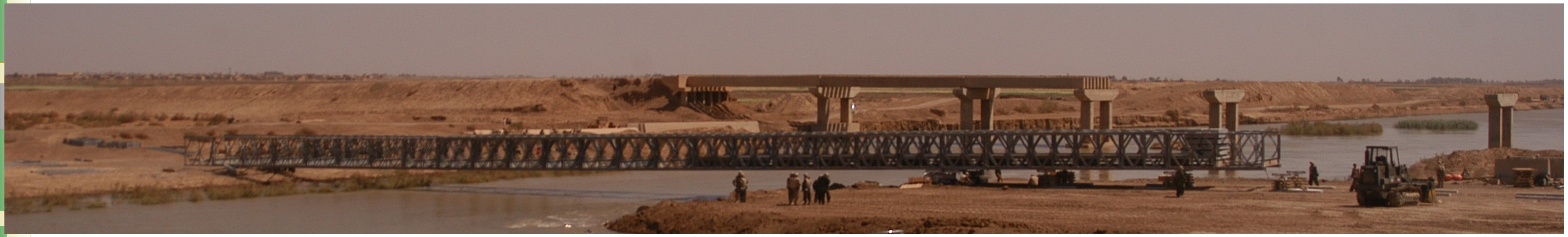
Lightweight ROWPU Development

Current Tactical Water Purification System



HMMWV mounte
ROWPU

Deliberate Bridging for OIF



FLEXIFLOAT
FLEXIFLOAT

6000 tons, 250 tractor trailer loads

Composite Bridging Experimentation

- **Carbon Fiber Cloth set in resin**
- **Resin applied via vacuum process in plastic molds**
- **Cured in “ovens”**

In-Field Manufacturing Methods

Vacuum Assisted Resin Transfer Molding (V/RTM)

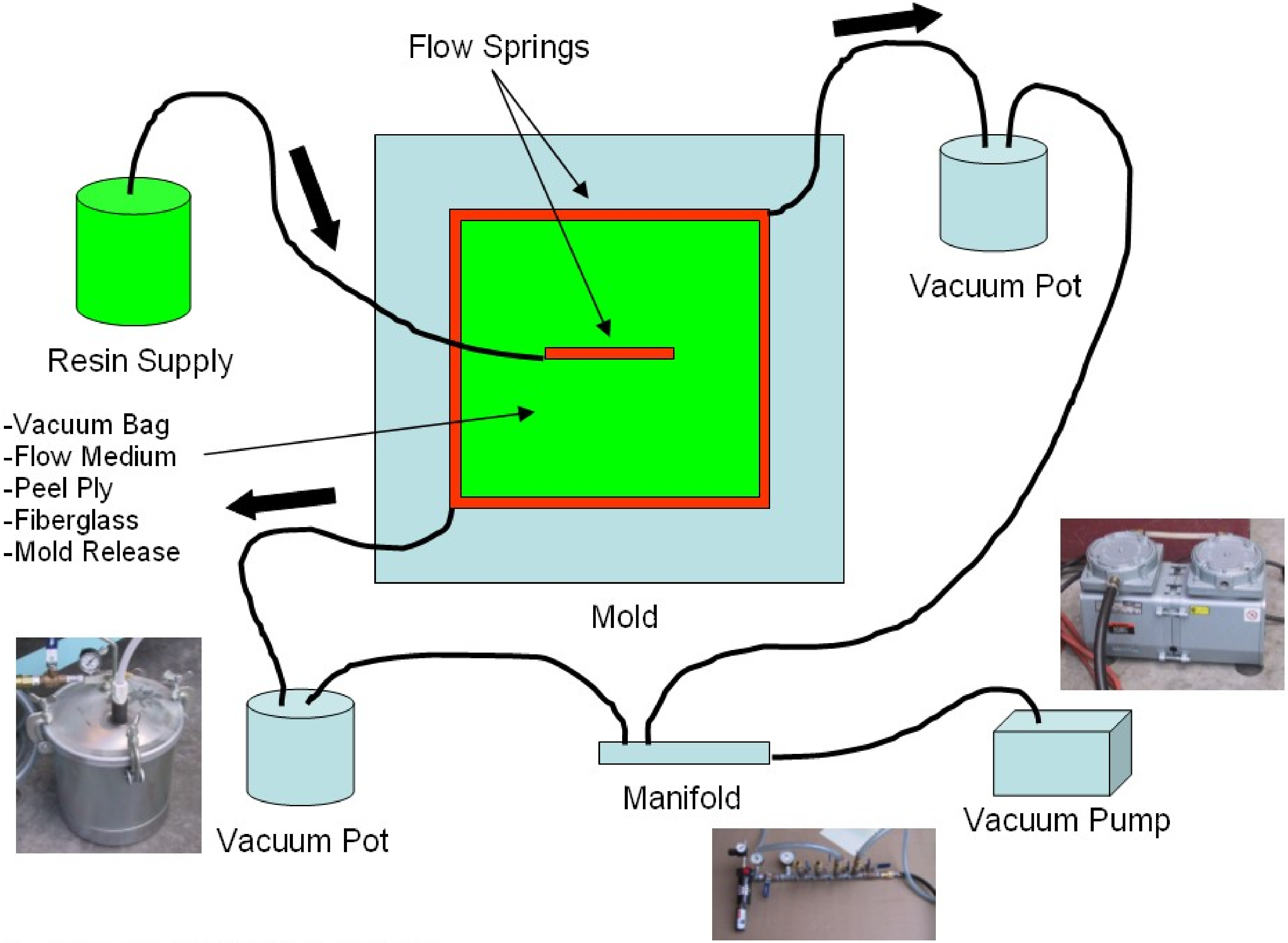
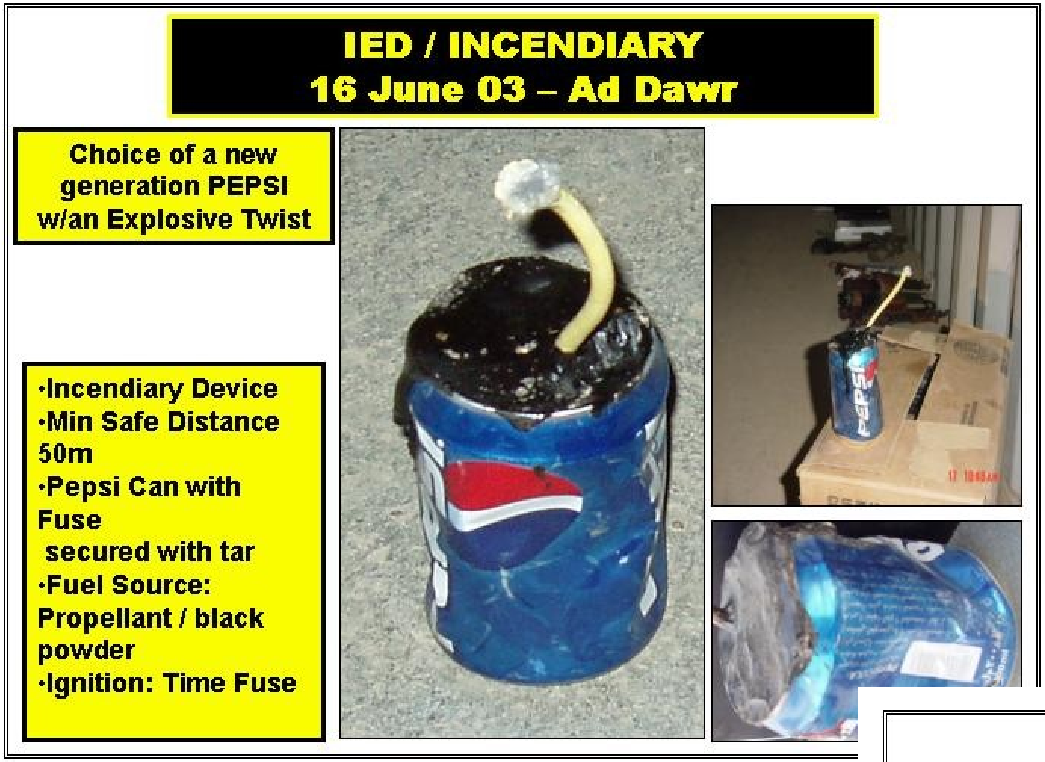

Flow Springs
Resin Supply
Vacuum Pot
-Vacuum Bag
-Flow Medium
-Peel Ply
-Fiberglass
-Mold Release
Mold
Vacuum Pot
Manifold
Vacuum Pump

Figure 1. Resin infusion setup diagram.

Roadside Bombs - Explosive Casualties
As of 16 March2004

Type	WIA	KIA
Mines	70	4
IEDs	1098	101
UXO/Sub-munitions	39	6
Total	1207	111

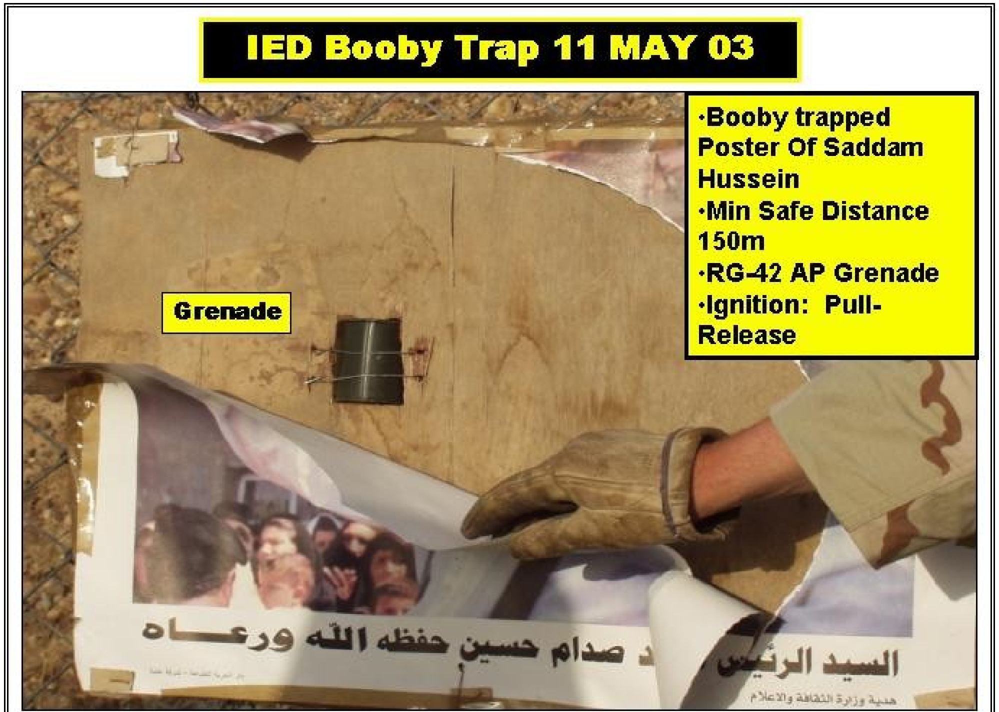
IEDs



IED / INCENDIARY
16 June 03 – Ad Dawr

Choice of a new generation PEPSI w/an Explosive Twist

- Incendiary Device
- Min Safe Distance 50m
- Pepsi Can with Fuse secured with tar
- Fuel Source: Propellant / black powder
- Ignition: Time Fuse



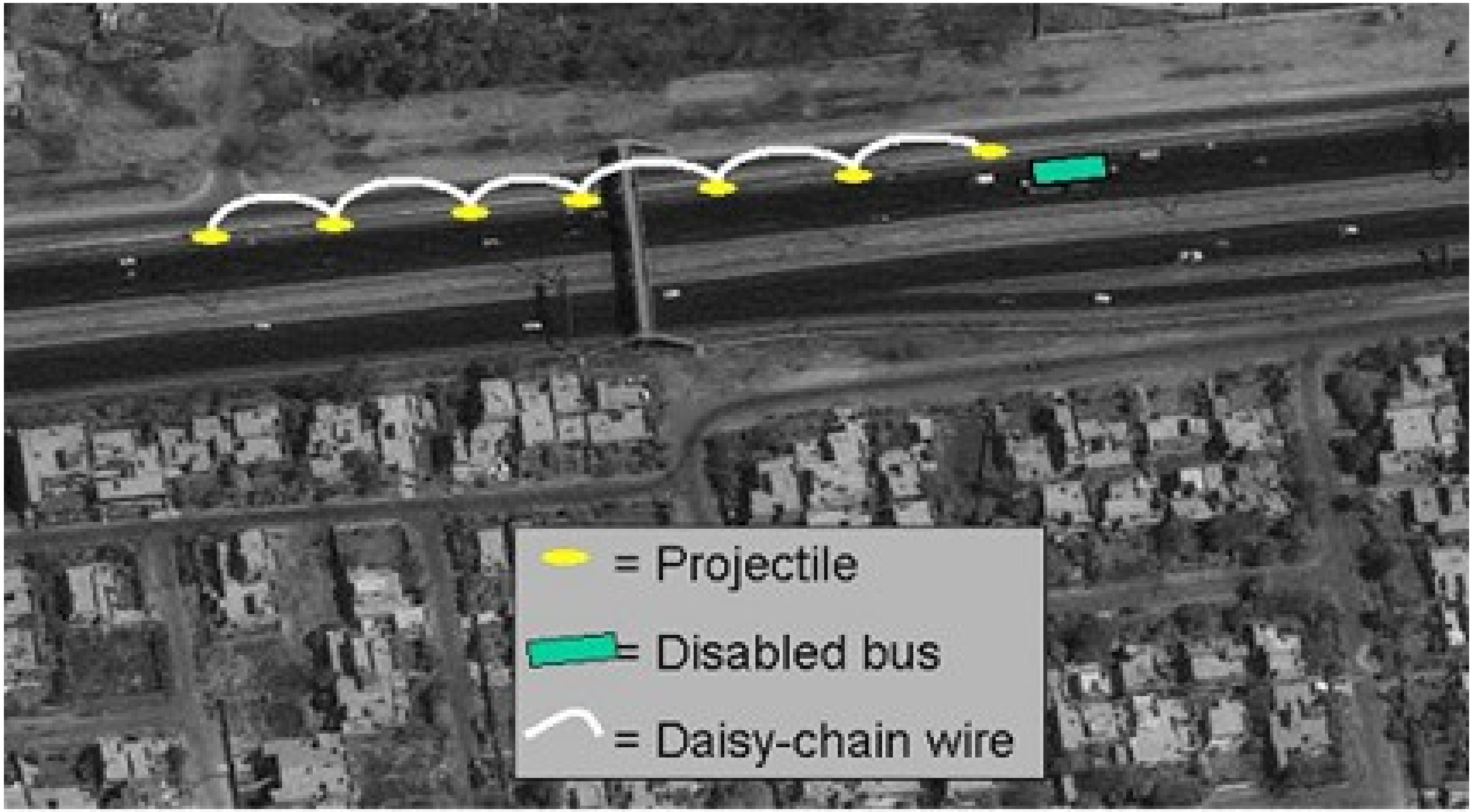
IED Booby Trap 11 MAY 03

- Booby trapped Poster Of Saddam Hussein
- Min Safe Distance 150m
- RG-42 AP Grenade
- Ignition: Pull-Release

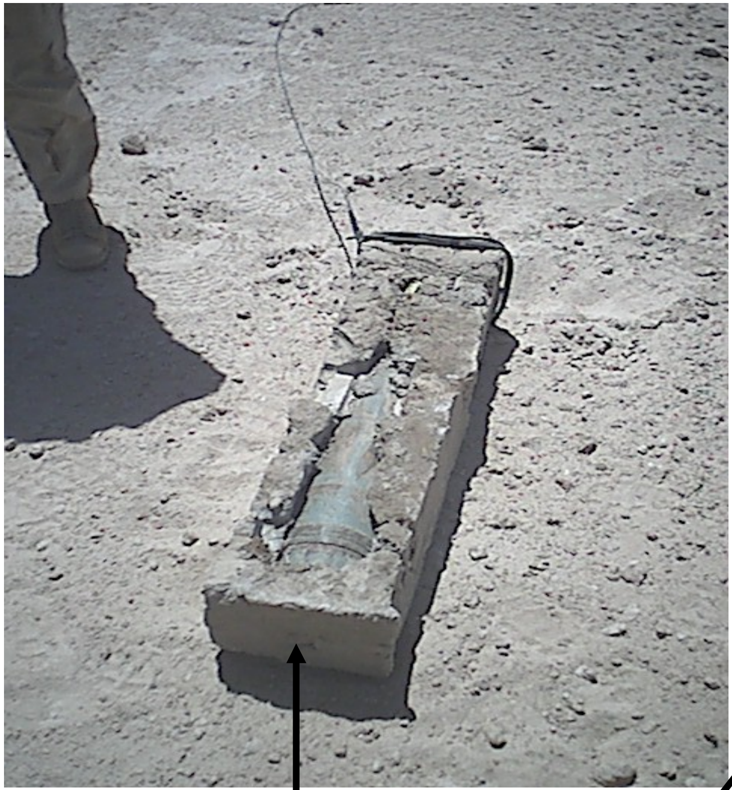
Grenade

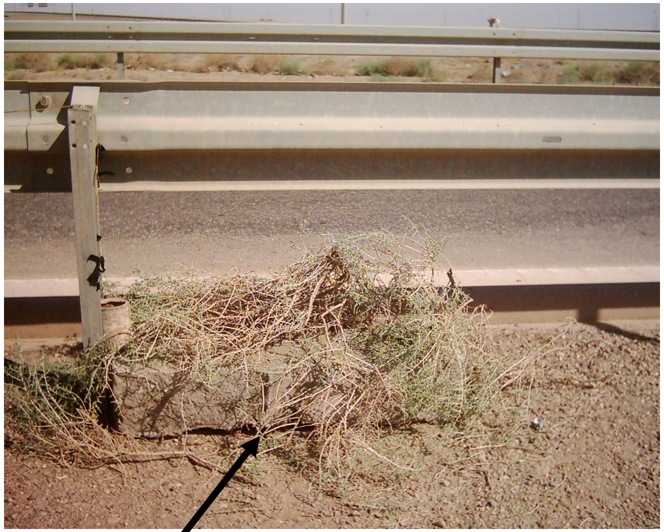
السيد الرئيس
صدام حسين حفظه اللّه ورعاه
هدية وزارة الثقافة والاعلام

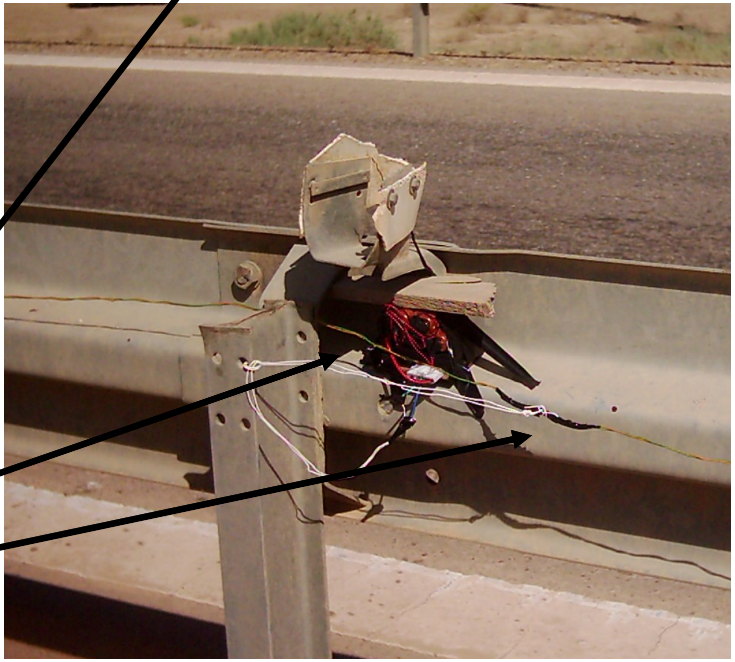
Daisy-Chain IEDs
(Parallel Series)


= Projectile
= Disabled bus
= Daisy-chain wire

Sophisticated IEDs





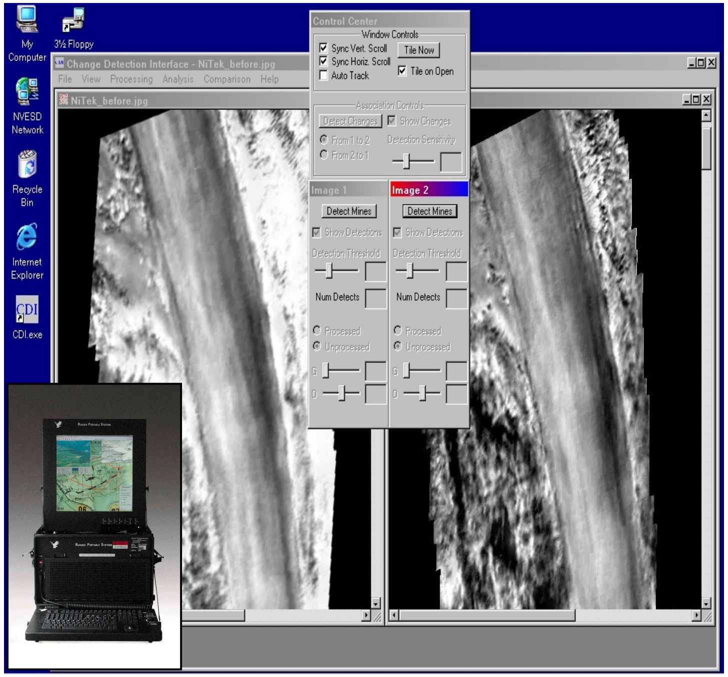


IED Hidden in Plaster made to look like concrete block on side of road under debris

Garage Door opener detonation device (Notice Wire)

IED/Mine Detection

- IR Sensors
- Change Detection



Change Detection Interface - NiTek_before.jpg

NiTek_before.jpg

Control Center

Window Controls

☑ Sync Vert. Scroll

☑ Sync Horiz. Scroll

☐ Auto Track

☑ Tile on Open

Association Controls

☑ Show Changes

● From 1 to 2

○ From 2 to 1

Image 1

☑ Show Detections

○ Processed

● Unprocessed

Image 2

☑ Show Detections

○ Processed

● Unprocessed

My Computer
3½ Floppy
NVESD Network
Recycle Bin
Internet Explorer
CDI.exe
File
View
Processing
Analysis
Comparison
Help
Tile Now
Detect Changes
Detection Sensitivity
Detect Mines
Detection Threshold
Num Detects
G
O
Detect Mines
Detection Threshold
Num Detects
G
O
Rugged Portable Systems

95.1 KD